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| EXAMINER | |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/973,629 | CHENG ET AL. | |
| | Examiner | Art Unit | |
| | Ann Y. Lam | 1641 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *09 August 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *79-96 and 98-110* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *79-96 and 98-110* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Double Patenting*

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

**1.** Claims 79, 80, 82-85 and 87-94 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 14-16, 23, 27, 31, 99 and 120 of copending Application No. 09/679,024 in view of Pourahmadi et al., 6,440,725.

Application No. 09/679,024, claims a chip comprising built-in structures that generate different types of physical fields to exert at least two different types of physical forces on a moiety to manipulate the moiety, wherein the physical forces are selected

from electric, magnetic and acoustic forces and the built-in structures that generates the electric field comprises at least one microelectrode element.

Application No. 09/679,024 however does not disclose an integrated system comprising more than one chip, nor specifically three sets of electrodes.

However, Pourahmadi et al. teach incorporation of microfluidic chips or components into larger cartridges having any desired combination of microscale to macroscale channels, chambers, reservoirs, detection and processing regions, which makes it possible to exploit the key attributes of microfabricated chips and other miniature fluidic or analytical components in a convention, cartridge-type, physical environment, thus resolving the dilemma between large sample volumes and microfludic structures (col. 2, lines 27-36.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the chip claimed in Application No. 09/679,024 in a cartridge as taught by Pourahmadi et al. because Pourahmadi et al. teach that such a cartridge provides the advantages of exploiting the key attributes of microfabricated chips and other miniature fluidic or analytical components in a cartridge thus resolving the dilemma between large sample volumes and microfluidic structures. The cartridge, being comprised of more than 1 chip, is deemed to be a chip itself, or an integrated biochip system comprising one or more chips, because it has all the structures of a chip and can be of a small scale, and a chip can be formed from separate components so long as the components are integrated into a unit.

Moreover, Pourahmadi et al. teach using two *or more* electrodes (col. 21, line 58) for the purpose of moving molecules (col. 21, lines 60-63). Applicants claim at least three sets of electrodes. Because Pourahmadi et al. using two *or more* electrodes for the purpose of moving molecules, it is reasonable to interpret the disclosure by Pourahmadi et al. as encompassing at least three sets of electrodes (i.e., at least six electrodes).

Alternatively, while Pourahmadi et al. teach using two or more electrodes (col. 21, line 58) for the purpose of moving molecules (col. 21, lines 60-63), Pourahmadi et al. do not specifically disclose using at least three sets of electrodes (i.e., at least six electrodes). However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05 IIA, citing *In re Aller*, 105 USPQ 233.) In this case, Pourahmadi et al. teach the general conditions of the claim, including the suggestion to use more than two electrodes, and moreover using three sets of electrodes is within an optimum or workable range and thus its discovery involves only routine skill in the art.

As to claims 83, 85 and 92, Application No. 09/679,024 does not specifically claim that the electric field is a traveling wave dielectrophoresis electrode array. However, Pourahmadi et al. teach a traveling wave dielectrophoresis electrode array for the benefit of manipulating molecules from place to place (col. 21, line 56 – col. 22, line 2.) It would have been obvious to one of ordinary skill in the art to utilize the traveling wave dielectrophoresis electrode array as the type of element for producing an electric

field in Application No. 09/679,024 because Pourahmadi et al. teach that such an electrode array provides the benefit of manipulating molecules from place to place, as a specific means for manipulating a moiety claimed in Application No. 09/679,024.

As to the following claims, Pourahmadi et al. disclose the limitations as follows.

As to claim 80, the chip further comprises an acoustic element (i.e., the piezomembrane or ultrasonic horn built into the cartridge, see col. 16, line 40-53, and col. 3, lines 51-52.) The piezomembrane or ultrasonic horn is an acoustic element because it is an element that causes vibration.

As to claim 82, as indicated above, the discovery of optimum or workable number of electrodes involves only routine skill in the art. (Claim 82 is interpreted to mean that the chip further comprises at least one electrode in addition to the electrodes recited in independent claim 79, from which claim 82 depends.)

As to claims 83, 85 and 92, a traveling wave dielectrophoresis electrode array (col. 21, line 56 – col. 22, line 2) is disclosed. The Office notes that some of the electrodes of Pourahmadi et al. are considered to be part of the traveling wave dielectrophoresis electrode array and some of the electrodes of Pourahmadi et al. are considered to be part of the particle switch. Applicant has not claimed the particle switch in such a way that it is distinguished over the prior art. As to claim 99, the traveling wave dielectrophoresis electrode array is considered to be a layer.

As to claim 84, the chip comprises a chamber (see fig. 6 for example.)

As to claim 87, a sample applied to the biochip system can remain continuously within the system from the beginning of the first sequential task until the end of the last

sequential task performed by the system. (Examiner notes that this limitation relates to intended use and that a sample in the biochip is capable of remaining continuously within the system as claimed.)

As to claim 88, the biochip system is automated (see for example, col. 18, lines 40-50.)

As to claim 89, the biochip system comprises more than one chip (col. 2, lines 27-33). The cartridge, comprised of more than 1 chip, is considered itself to be a chip because it has all the structures of a chip and can be of a small scale. That is, a chip can be formed from separate components so long as the components are integrated into a unit. Moreover, the cartridge disclosed by Pourahmadi et al. is considered to be the claimed biochip system comprising more than one chip (col. 2, lines 27-33). That is, the cartridge disclosed by Pourahmadi et al. is itself a type of chip, and it is also a biochip system comprising more than one component, each of the components itself being also chips (i.e., smaller chips).

As to claim 90, the two chips can be in fluid communication with one another (col. 2, lines 27-37, and col. 3, lines 8-21).

As to claim 91, sample components are capable of being moved from one chip to another by a mechanism other than fluid flow. It is noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

As to claim 93, the particle switch are connected at a common branch point, that is, where they are controlled, since they are disclosed as being controlled for causing movement of molecules (col. 21, lines 56-67).

As to claim 94, the electrodes of the particle switch are capable of being connected to out –of-phase signals.

This is a provisional obviousness-type double patenting rejection.

**2.** Claims 81, 86, 95, 96 and 98-110 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 14-16, 23, 27, 31, 99 and 120 of copending Application No. 09/679,024 in view of Pourahmadi et al., 6,440,725, in view of Blankenstein, 6,432,630.

Application No. 09/679,024, claims a chip comprising built-in structures that generate different types of physical fields to exert at least two different types of physical forces on a moiety to manipulate the moiety, wherein the physical forces are selected from electric, magnetic and acoustic forces and the built-in structures that generates the electric field comprises at least one microelectrode element.

Application No. 09/679,024 however does not disclose an integrated system comprising more than one chip, nor specifically three sets of electrodes.

However, Pourahmadi et al. teach incorporation of microfluidic chips or components into larger cartridges having any desired combination of microscale to macroscale channels, chambers, reservoirs, detection and processing regions, which

makes it possible to exploit the key attributes of microfabricated chips and other miniature fluidic or analytical components in a convention, cartridge-type, physical environment, thus resolving the dilemma between large sample volumes and microfludic structures (col. 2, lines 27-36.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the chip claimed in Application No. 09/679,024 in a cartridge as taught by Pourahmadi et al. because Pourahmadi et al. teach that such a cartridge provides the advantages of exploiting the key attributes of microfabricated chips and other miniature fluidic or analytical components in a cartridge thus resolving the dilemma between large sample volumes and microfluidic structures. The cartridge, being comprised of more than 1 chip, is deemed to be a chip itself, or an integrated biochip system comprising one or more chips, because it has all the structures of a chip and can be of a small scale, and a chip can be formed from separate components so long as the components are integrated into a unit. The cartridge, being comprised of more than 1 chip, is deemed to be a chip itself, or an integrated biochip system comprising one or more chips, because it has all the structures of a chip and can be of a small scale, and a chip can be formed from separate components so long as the components are integrated into a unit.

Moreover, Pourahmadi et al. teach using two *or more* electrodes (col. 21, line 58) for the purpose of moving molecules (col. 21, lines 60-63). Applicants claim at least three sets of electrodes. Because Pourahmadi et al. using two *or more* electrodes for the purpose of moving molecules, it is reasonable to interpret the disclosure by

Pourahmadi et al. as encompassing at least three sets of electrodes (i.e., at least six electrodes).

Alternatively, while Pourahmadi et al. teach using two or more electrodes (col. 21, line 58) for the purpose of moving molecules (col. 21, lines 60-63), Pourahmadi et al. do not specifically disclose using at least three sets of electrodes (i.e., at least six electrodes). However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05 IIA, citing *In re Aller*, 105 USPQ 233.) In this case, Pourahmadi et al. teach the general conditions of the claim, including the suggestion to use more than two electrodes, and moreover using three sets of electrodes is within an optimum or workable range and thus its discovery involves only routine skill in the art.

As to claims 81, 86, 95, 102, 108 and 110, Applicants further recite an array of electromagnetic units which can move one or more sample components from one area of the chip to one other area of the chip by traveling wave magnetophoresis. Pourahmadi et al. teach applying a series of magnetic fields to the cartridge (e.g., by means of switchable electromagnets) to vibrate or move beads functionalized with various binding agents within the cartridge from one region to another (col. 18, lines 43-47.) As noted earlier, the movement of magnetic beads from one region to another by applying a series of magnetic fields for example, by means of switchable electromagnets, disclosed by Pourahmadi et al. (col. 18, lines 45-7), is deemed to be movement of the beads by traveling wave magnetophoresis because the series of

magnetic fields disclosed by Pourahmadi et al. generates sequentially addressed magnetic fields ,and generating sequentially addressed magnetic fields such that a magnetic particle transfers from one location to another is described by Applicants as producing traveling wave magnetophoresis.

However, it appears that the electromagnets are *external* to the cartridge because, in describing the movement of magnetic beads, Pourahmadi et al. teach that the "cartridge may be fabricated in such a way that specific regions or regions may interact with the external environment via magnetic forces" (col. 18, lines 40-42.) Thus, it does not appear that Pourahmadi et al. teach that the electromagnets are within the cartridge itself, or that the cartridge comprise the electromagnets.

Blankenstein however teach that magnets for producing magnetophoresis for manipulating a magnetically labeled molecule may be electromagnets that are positioned adjacent to the flow channel so that the magnetic field is substantially perpendicular to a longitudinal axis of the flow channel, and that in a preferred embodiment, the magnets are positioned in and glued to slots that are etched into a silicon chip and located adjacent to the flow channel (col. 5, line 60 – col. 6, line 4.) Blankenstein also disclose that the device is a micro flow system (col. 6, lines 1-6) and that the magnetic field is used for separation of macromolecules labeled with magnetic beads by magnetophoresis (col. 11, line 31 and col. 18, lines 50-59.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide electromagnets that are within a device, adjacent the flow channel, as taught by Blankenstein, in the Pourahmadi et al. device, because Blankenstein teaches that this is

a preferred embodiment, allowing for the production of a magnetic field to move particles. The skilled artisan would also recognize the benefit of the convenience of providing the magnets within the device as taught by Blankenstein, as opposed to a separate element, particularly in light of the disclosure by Blankenstein that the flow chip is an important component of a portable micro system for cell sorting and analysis (col. 9, lines 3-4.)

As to the following claims, Pourahmadi et al. disclose the limitations as follows.

As to claim 96, the chip further comprises an acoustic element (i.e., the piezomembrane or ultrasonic horn built into the cartridge, see col. 16, line 40-53, and col. 3, lines 51-52.) The piezomembrane or ultrasonic horn is an acoustic element because it is an element that causes vibration.

As to claim 98, one of the multiple electrodes disclosed in column 21, line 35 – col. 22, line 2, is considered to be an electrode recited in claim 98.

As to claims 99 and 101, Pourahmadi et al. disclose a traveling wave dielectrophoresis electrode array (col. 21, line 56 – col. 22, line 2). The Office notes that some of the electrodes of Pourahmadi et al. are considered to be part of the traveling wave dielectrophoresis electrode array and some of the electrodes of Pourahmadi et al. are considered to be part of the particle switch. Applicant has not claimed the particle switch in such a way that it is distinguished over the prior art. As to claim 99, the traveling wave dielectrophoresis electrode array is considered to be a layer.

As to claim 100, the chip comprises a chamber (see fig. 6 for example.)

As to claim 103, a sample applied to the biochip system can remain continuously within the system from the beginning of the first sequential task until the end of the last sequential task performed by the system. (Examiner notes that this limitation relates to intended use and that a sample in the biochip is capable of remaining continuously within the system as claimed.)

As to claim 104, the biochip system is automated (see for example, col. 18, lines 40-50.)

As to claim 105, the biochip system comprises more than one chip (see col. 2, lines 27-33, disclosing incorporation of microfluidic chips or components into larger cartridges having any desired combination of microscale to macroscale channels, chambers, etc.)

As to claim 106, the two chips can be in fluid communication with one another (col. 2, lines 27-37, and col. 3, lines 8-21).

As to claim 107, sample components are capable of being moved from one chip to another by a mechanism other than fluid flow, e.g. by magnetic field (col. 18, lines 45-47.) It is noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

As to claim 109, at least one of the chips (i.e., chip components of the Pourahmadi et al. cartridge) is deemed to be an active, particle switch chip (because the chip comprises electrodes and can move particles (col. 21, line 56 – col. 22, line 2).

This is a provisional obviousness-type double patenting rejection.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**3.** Claims 79, 80, 82-85 and 87-94 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Pourahmadi et al., 6,440,725.

As to claim 79, Pourahmadi et al. disclose a biochip system wherein at least one of the chips (see col. 2, lines 27-33, disclosing incorporation of microfluidic chips or components into larger cartridges having any desired combination of microscale to macroscale channels, chambers, etc.; the cartridge, being comprised of more than 1 chip, is deemed to be a chip itself because it has all the structures of a chip and can be of a small scale, and a chip can be formed from separate components so long as the components are integrated into a unit)

is a multiple force chip (col. 19, lines 17-19, and col. 25, lines 45-50 and figures 6 and 7, disclosing resistive heating element 34 on the bottom surface of substrate 22, and col. 21, line 35 – col. 22, line 2, disclosing electrodes in contact with fluid for

manipulation of molecules, and col. 3, lines 50-55, disclosing an ultrasonic horn built into the cartridge, wherein the cartridge may also contain a heating element for heating the fluid sample as the ultrasonic energy is applied),

wherein the multiple force chip comprises multiple functional elements in different structurally linked layers that are vertically oriented with respect to one another (the resistive heating element 34 is disclosed on the bottom surface of the substrate, below the fluid channels, and the electrodes are disclosed as being in contact with the fluid, that is, in the fluid channels, vertically oriented with the resistive heating element; or alternatively, the heating element, which is disclosed to be preferably on the bottom wall of a chamber or bottom surface of the substrate (col. 16, lines 46-48), is considered to be vertically or capable of being vertically oriented with the ultrasonic transducer that is built into the cartridge (i.e., into another area of the cartridge), (col. 3, lines 50-52) depending on how the cartridge is positioned),

and further wherein the biochip system can perform two or more sequential tasks (heating and moving molecules), including a processing task (heating),

and further wherein the multiple force chip comprises at least one particle switch, comprising electrodes (see col. 21, line 56 – col. 22, line 2) that are independent of one another and can move particles along different pathways.

Pourahmadi et al. using two *or more* electrodes (col. 21, line 58) for the purpose of moving molecules (col. 21, lines 60-63). Applicants claim at least three sets of electrodes. Because Pourahmadi et al. using two *or more* electrodes for the purpose of

moving molecules, it is reasonable to interpret the disclosure by Pourahmadi et al. as encompassing at least three sets of electrodes (i.e., at least six electrodes).

Alternatively, while Pourahmadi et al. teach using two or more electrodes (col. 21, line 58) for the purpose of moving molecules (col. 21, lines 60-63), Pourahmadi et al. do not specifically disclose using at least three sets of electrodes (i.e., at least six electrodes). However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05 IIA, citing *In re Aller*, 105 USPQ 233.) In this case, Pourahmadi et al. teach the general conditions of the claim, including the suggestion to use more than two electrodes, and moreover using three sets of electrodes is within an optimum or workable range and thus its discovery involves only routine skill in the art.

Moreover, the movement of magnetic beads from one region to another by applying a series of magnetic fields for example, by means of switchable electromagnets, disclosed by Pourahmadi et al. (col. 18, lines 45-7), is deemed to be movement of the beads by traveling wave magnetophoresis because the series of magnetic fields disclosed by Pourahmadi et al. generates sequentially addressed magnetic fields ,and generating sequentially addressed magnetic fields such that a magnetic particle transfers from one location to another is described by Applicants as producing traveling wave magnetophoresis.

As to claim 80, the chip further comprises an acoustic element (i.e., the piezomembrane or ultrasonic horn built into the cartridge, see col. 16, line 40-53, and

col. 3, lines 51-52.) The piezomembrane or ultrasonic horn is an acoustic element because it is an element that causes vibration.

As to claim 82, as indicated above, the discovery of optimum or workable number of electrodes involves only routine skill in the art. (Claim 82 is interpreted to mean that the chip further comprises at least one electrode in addition to the electrodes recited in independent claim 79, from which claim 82 depends.)

As to claims 83, 85 and 92, a traveling wave dielectrophoresis electrode array (col. 21, line 56 – col. 22, line 2) is disclosed. The Office notes that some of the electrodes of Pourahmadi et al. are considered to be part of the traveling wave dielectrophoresis electrode array and some of the electrodes of Pourahmadi et al. are considered to be part of the particle switch. Applicant has not claimed the particle switch in such a way that it is distinguished over the prior art. As to claim 99, the traveling wave dielectrophoresis electrode array is considered to be a layer.

As to claim 84, the chip comprises a chamber (see fig. 6 for example.)

As to claim 87, a sample applied to the biochip system can remain continuously within the system from the beginning of the first sequential task until the end of the last sequential task performed by the system. (Examiner notes that this limitation relates to intended use and that a sample in the biochip is capable of remaining continuously within the system as claimed.)

As to claim 88, the biochip system is automated (see for example, col. 18, lines 40-50.)

As to claim 89, the biochip system comprises more than one chip (col. 2, lines 27-33). The cartridge, comprised of more than 1 chip, is considered itself to be a chip because it has all the structures of a chip and can be of a small scale. That is, a chip can be formed from separate components so long as the components are integrated into a unit. Moreover, the cartridge disclosed by Pourahmadi et al. is considered to be the claimed biochip system comprising more than one chip (col. 2, lines 27-33). That is, the cartridge disclosed by Pourahmadi et al. is itself a type of chip, and it is also a biochip system comprising more than one component, each of the components itself being also chips (i.e., smaller chips).

As to claim 90, the two chips can be in fluid communication with one another (col. 2, lines 27-37, and col. 3, lines 8-21).

As to claim 91, sample components are capable of being moved from one chip to another by a mechanism other than fluid flow. It is noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

As to claim 93, the particle switch are connected at a common branch point, that is, where they are controlled, since they are disclosed as being controlled for causing movement of molecules (col. 21, lines 56-67).

As to claim 94, the electrodes of the particle switch are capable of being connected to out –of-phase signals.

**4.** Claims 81, 86, 95, 96 and 98-110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pourahmadi et al., 6,440,725, in view of Blankenstein, 6,432,630.

Pourahmadi et al. disclose the invention substantially as claimed (see above). As to claims 81, 86, 95, 102, 108 and 110, Applicants further recite an array of electromagnetic units which can move one or more sample components from one area of the chip to one other area of the chip by traveling wave magnetophoresis. Pourahmadi et al. teach applying a series of magnetic fields to the cartridge (e.g., by means of switchable electromagnets) to vibrate or move beads functionalized with various binding agents within the cartridge from one region to another (col. 18, lines 43-47.) As noted earlier, the movement of magnetic beads from one region to another by applying a series of magnetic fields for example, by means of switchable electromagnets, disclosed by Pourahmadi et al. (col. 18, lines 45-7), is deemed to be movement of the beads by traveling wave magnetophoresis because the series of magnetic fields disclosed by Pourahmadi et al. generates sequentially addressed magnetic fields ,and generating sequentially addressed magnetic fields such that a magnetic particle transfers from one location to another is described by Applicants as producing traveling wave magnetophoresis.

However, it appears that the electromagnets are *external* to the cartridge because, in describing the movement of magnetic beads, Pourahmadi et al. teach that

the "cartridge may be fabricated in such a way that specific regions or regions may interact with the external environment via magnetic forces" (col. 18, lines 40-42.) Thus, it does not appear that Pourahmadi et al. teach that the electromagnets are within the cartridge itself, or that the cartridge comprise the electromagnets.

Blankenstein however teach that magnets for producing magnetophoresis for manipulating a magnetically labeled molecule may be electromagnets that are positioned adjacent to the flow channel so that the magnetic field is substantially perpendicular to a longitudinal axis of the flow channel, and that in a preferred embodiment, the magnets are positioned in and glued to slots that are etched into a silicon chip and located adjacent to the flow channel (col. 5, line 60 – col. 6, line 4.) Blankenstein also disclose that the device is a micro flow system (col. 6, lines 1-6) and that the magnetic field is used for separation of macromolecules labeled with magnetic beads by magnetophoresis (col. 11, line 31 and col. 18, lines 50-59.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide electromagnets that are within a device, adjacent the flow channel, as taught by Blankenstein, in the Pourahmadi et al. device, because Blankenstein teaches that this is a preferred embodiment, allowing for the production of a magnetic field to move particles. The skilled artisan would also recognize the benefit of the convenience of providing the magnets within the device as taught by Blankenstein, as opposed to a separate element, particularly in light of the disclosure by Blankenstein that the flow chip is an important component of a portable micro system for cell sorting and analysis (col. 9, lines 3-4.)

As to the following claims, Pourahmadi et al. disclose the limitations as follows.

As to claim 96, the chip further comprises an acoustic element (i.e., the piezomembrane or ultrasonic horn built into the cartridge, see col. 16, line 40-53, and col. 3, lines 51-52.) The piezomembrane or ultrasonic horn is an acoustic element because it is an element that causes vibration.

As to claim 98, one of the multiple electrodes disclosed in column 21, line 35 – col. 22, line 2, is considered to be an electrode recited in claim 98.

As to claims 99 and 101, Pourahmadi et al. disclose a traveling wave dielectrophoresis electrode array (col. 21, line 56 – col. 22, line 2). The Office notes that some of the electrodes of Pourahmadi et al. are considered to be part of the traveling wave dielectrophoresis electrode array and some of the electrodes of Pourahmadi et al. are considered to be part of the particle switch. Applicant has not claimed the particle switch in such a way that it is distinguished over the prior art. As to claim 99, the traveling wave dielectrophoresis electrode array is considered to be a layer.

As to claim 100, the chip comprises a chamber (see fig. 6 for example.)

As to claim 103, a sample applied to the biochip system can remain continuously within the system from the beginning of the first sequential task until the end of the last sequential task performed by the system. (Examiner notes that this limitation relates to intended use and that a sample in the biochip is capable of remaining continuously within the system as claimed.)

As to claim 104, the biochip system is automated (see for example, col. 18, lines 40-50.)

As to claim 105, the biochip system comprises more than one chip (see col. 2, lines 27-33, disclosing incorporation of microfluidic chips or components into larger cartridges having any desired combination of microscale to macroscale channels, chambers, etc.)

As to claim 106, the two chips can be in fluid communication with one another (col. 2, lines 27-37, and col. 3, lines 8-21).

As to claim 107, sample components are capable of being moved from one chip to another by a mechanism other than fluid flow, e.g. by magnetic field (col. 18, lines 45-47.) It is noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

As to claim 109, at least one of the chips (i.e., chip components of the Pourahmadi et al. cartridge) is deemed to be an active, particle switch chip (because the chip comprises electrodes and can move particles (col. 21, line 56 – col. 22, line 2).

***Response to Arguments***

Applicants' arguments filed August 9, 2007 have been considered and are persuasive in part and not persuasive in part.

Applicant argues that Examiner has pieced together disjointed disclosures from Pourahmadi to create the rejection and that there is no disclosure that the embodiments

referred to by Examiner, for example, the embodiment with the resistive heating element, include other features. This argument is not persuasive because Pourahmadi discloses that various components, referred to by Pourahmadi as chips, can be incorporated into a larger structure, referred to by Pourahmadi as a cartridge, and it is understood that these disclosed elements can be combined in the various chips of the cartridge as desired (see for example, col. 19, lines 8-19, and col. 25, lines 45-50.) It would not make sense that Pourahmadi discloses or suggests an analytical cartridge with multiple components or chips that only have heating elements and none of the other elements that are normally used to analyze samples.

Applicant also argues that the Pourahmadi cartridge is not a chip and thus Pourahmadi et al. does not disclose or suggest a single chip that is a multiple force chip. Applicant states that the rejection is based on a meaning of chip that contradicts the ordinary usage of the work chip as used in the cited reference. These arguments are not persuasive because the rejection is based on Applicant's disclosure of what constitutes a chip. Page 15, lines 13-16 of Applicant's specification discloses that a chip can have different types of micro scale structures that provide sources of different physical forces. The Pourahmadi cartridge is comprised of micro scale structures (i.e., referred to as chips or components by Pourahmadi) that provide sources of different physical forces, and the cartridge itself is an integral structure and is of relatively small dimensions and thus would be considered a chip under Applicant's description of a chip in the specification.

### *Conclusion*

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ann Y. Lam whose telephone number is 571-272-0822. The examiner can normally be reached on Mon.-Fri. 10-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ann Y. Lam
Primary Patent Examiner